Unit 1 worksheet #1 **Name** KEY

Hour_____

1. You have two bags of marbles, each of which holds one blue, one red and one green marble. You choose one marble at random from each bag. Make a tree diagram and list all possible outcomes.

OUTCOMES

BB
BR
BG
RB
RR
RG
GB
GR
GG

2. You have one penny, one nickel, one dime and one quarter in your pocket. You select two coins at random. Make a tree diagram and list all possible outcomes.

OUTCOMES

PN
PD
PQ
NP
ND
NQ
DP
DN
DQ
QP
QN
QD

3. Three coins are tossed. Make a tree diagram and list all possible outcomes.

OUTCOMES

HHH
HHT
HTH
HTT
THH
THT
TTH
TTT

6. You toss quarter, toss a dime and roll a six-sided die. How many results are possible?

24

7. Next semester you are going to take one science class, one math class, one history class and one English class. According to the schedule you have 4 different science classes, 3 different math classes, 2 different history classes, and 3 different English classes to choose from. Assuming no scheduling conflicts, how many different four-course selections can you make?

72

8. Bill has to take a 8 question true/false quiz, but he hasn't studied. He will guess at each problem. In how many different ways is it possible to answer the quiz questions?

256

9. Glenna has to take a 5 question multiple-choice test, but she hasn't studied. She will guess at each problem. For each problem the possible responses are A, B, C, or D. In how many different ways is it possible to answer the test questions?

1024

10. Jesse has to take a 12 question matching quiz, but he hasn't studied. He will guess at each problem. In how many different ways is it possible to answer the quiz questions?

479,001,600

11. Kim flips a penny, a dime, a nickel, a quarter, and a 50-cent piece. How many different outcomes of heads and tails are possible?

32

12. If you want to hit one note on a piano (which has 88 keys) and play one string on a banjo (which has 5 strings), then how many ways are there to do both?

440

13. How many ways are there to pick 2 cards (without replacement) from a deck of 52 cards?

2652

14. The captains of two teams meet at midfield for the coin toss. Team A has 4 captains, and team B has 3 captains. Each captain of team A shakes hands once with each captain of team B. How many handshakes occur?

12

15. A 'combination' lock has a dial bearing the numbers 1 through 16. How many different 3-number 'combinations' are possible if repetitions are allowed?

4096

Unit 1 worksheet #2 Name Key

Hour _____

1. How many computer passwords are possible for the following?

a. 2 digits followed by 4 letters (with repeats)? 45,697,600

b. 2 digits followed by 4 letters (without repeats)? 32,292,000

c. 3 letters followed by 3 digits (with repeats)? 17,576,000

d. 3 letters followed by 3 digits (without repeats)? 11,232,000

2. You were left with a list of 5 chores to complete. In how many orders can you complete all 5 of the chores?

120

3. The Spikers intramural volleyball team has 8 players. How many ways are there to choose players for the 6 starting positions?

20,160

4. The Blasters baseball team has 12 players on its roster. The manager has to pick 9 players for the batting order for the next game. How many possible line-ups are there?

79,833,600

5. The Minnesota Daily 3 Lottery pays out when a player matches all three digits (repeats allowed). How many different tickets could be created?

1000

6. How many different locker combinations can be created using 3 numbers if the locker dial goes from 1 to 30 and repeats are not allowed?

24,360

7. How many different radio station call letters beginning with either K or W are possible if:
a) letters *can* be repeated (4 letters in all)?

35,152

b) letters *cannot* be repeated (4 letters in all)?

27,600

8. Find the number of ways to arrange the letters in the word:

a. CAT 6

b. MOM 3

c. PHYSICS 2520

d. FOLLOW 180

e. POSSESS 210

f. MATHEMATICS 4,989,600

g. WWXXXYYYYZ 12,600

h. All the letters of your own first AND last name depends...

Unit 1 worksheet #3 Name Key

Hour _____

1. Nine people in your class want to be on a 5 person bowling team to represent the class. How many different teams can be chosen?

126

2. How many different 4-topping pizzas can be made choosing from twelve possible toppings with no repeats?

495

3. In bowling, how many ways might 2 out of the 10 pins be left standing after the rest have been knocked over?

45

4. A baseball team has 13 members. How many groups of 9 players are possible if the position of each member is not important?

715

5. A roller coaster has 3 seats and 4 children want to ride. How many ride combinations are possible? (Make an impossible assumption that little children don't fight over who sits where!)

4

6. In the game of Keno, the player is given a card containing 80 numbers. There are a variety of ways a person can bet. In how many ways can the player choose:

a. 1 number?

b. 2 numbers?

c. 3 numbers? 82,160

d. 4 numbers? 1,581,580

e. The most popular bet in Keno is 10 numbers. How many ways are there to make this choice?

1.646×10^{12}

7. The old Illinois Lottery had 54 balls, six of which are chosen. None of the six can be repeated and the order of the six is not important. How many possible combinations are there?

25,827,165

8. In 1998, the Illinois Lottery changed to 48 balls, six of which are chosen. Now what is the number of possibilities combinations?

12,271,512

9. How many different three-person committees can be forms from a group of 20 people?

1140

10. A committee of 4 men and 3 women is chosen from 10 men and 7 women. In how many different ways can it be done?

7350

11. Determine the number of ways of obtaining 4 heads and 2 tails in 6 tosses of a coin.

15

12. With a deck of 52 playing cards, find the number of possible 3-card hands that contain the cards specified:

a. 3 red cards 2600

b. 3 aces 4

c. 3 clubs 286

d. 3 of a kind 52

Unit 1 worksheet #4 **Name** Key **Hour**_____

For each problem, identify whether it is a permutation, combination, or "tree diagram" problem and then solve.

1. If a person can select three presents from ten presents under a Christmas tree, how many different combinations are there?

C: 120

2. How many ways can seven different types of soaps be displayed on a shelf in a grocery store?

P: 5040

3. Find the possible number of three digit numbers (repetitions allowed) using {2,6,7,8,9}.

TD: 125

4. a) How many ways can a student choose five questions from an exam containing 9 questions?

C: 126

b)How many ways are there if he must answer the first and last questions and any 3 additional?

C: 35

5. How many ways can 4 tickets be selected from 50 tickets if each ticket wins a different prize?

P: 5,527,200

6. I remember my friend's phone number starts with 323, but can't remember the other four numbers. How many possible phone numbers start with 323?

TD: 10,000

7. How many different ways can a computer programmer select 3 jobs from 15 possible?

C: 455

8. How many distinct arrangements are there for the word *STATISTICS*?

P: 50,400

9. How many different ID cards can be made if there are six digits and no digit can be use more than once?

P: 151,200

10. How many different ways can an EPA agent select 5 from a group of 13 factories to visit?

C: 1287

11. How many ways can a foursome of 2 men and 2 women be selected from 10 men and 12 women in a golf club?

C: 2970

12. How many different code words can be made using the letters A,A,A,B,B,B,C,D,D,D,D if the word must contain all 11 letters?

P: 46,200

13. How many ways can you create a meal from if you get to choose 2 from 5 first course options, 1 entrée from 7 options and 1 dessert from 4 options?

C: 280

14. Out of 3 books on Economics, 4 books on Political Science and 5 books on Geography, how many collections can be made if each collection consists of exactly one book on each subject?

TD: 60

15. How many different possible tests consisting of 18 questions can be made from a test bank of 20 questions?

C: 190

16. There are 6 boys and 3 girls in a class. A committee of 5 is to be selected such that 3 boys and 2 girls are on the committee. In how many ways can the committee be selected?

C: 60

17. How many different 3 number possibilities could there be for a combination lock using 0 - 53 with repeats allowed?

TD: 157,464

Unit 1 Review
Trees, Permutations and Combinations

Name Key

Period_____

1. A briefcase lock has 3 rotating cylinders, each containing 10 digits. How many numerical codes are possible?

TD: 1000

2. How many different ways can the letters in *ANNUALLY* be arranged?

P: 5040

3. How many different ways can the letters in *ABRACADABRA* be arranged?

P: 83,160

4. How many different combinations of 6 flavors of jelly beans can you make from a store that sells 20 different flavors of jelly beans?

C: 38,760

5. How many different 5-card hands contain 2 aces and 3 kings?

C: 24

6. How many different variations of pizza are available if you select 1 vegetable, 1meat, 1 sauce, and 1 type of crust from 11 vegetables, 5 meats, 2 sauces, and 3 crusts?

TD: 330

7. An amusement park has 17 different rides. You want to ride 14 of them. How many different combinations of rides can you go on?

C: 680

8. Your yearbook staff has an editor and assistant editor. In how many ways can students be chosen for these 2 positions if you have 15 on the staff?

P: 210

9. Auditions are being held for the play with 5 parts available. How many ways can the roles be assigned if 6 people audition?

P: 720

10. Daniel has 10 trophies he has won playing soccer. How many different ways can he arrange them in a row on his bookshelf?

P: 3,628,800

11. You must take 6 elective classes to meet your graduation requirements for college. There are 12 classes that you are interested in. How many ways can you select your elective classes?

C: 924

12. If you toss a coin, then roll a die, and then spin a 4-colored spinner with equal sections, how many outcomes are possible?

TD: 48

13. Find the number of different 7-digit telephone numbers if the first digit cannot be zero.

TD: 9,000,000

14. How many different 9-person batting orders can a coach create when there are 16 people on the team?

P: 4,151,347,200

15. You are asked to rank your top 10 favorite movies from the past year. If there were 355 movies released how many ways could you rank your top 10?

P: 2.8×10^{25}

16. Your school is having a carnival where there will be 15 games of chance to play. You will only have time to play 7 games. In how many ways can you choose which games to play?

C: 6435

17. Adrianna has 4 hats, 8 shirts, and 9 pairs of pants. Choosing one of each, how many different clothes combinations can she make?

TD: 288

18. How many ways are there to answer Mr. Smith's Chemistry exam if there are 7 matching, 3 multiple-choice (choose A, B, or C) and 4 true-false questions?

TD: 2,177,280

19. Draw a tree diagram and list all of the possible T-shirts available that come in sizes small, medium, large, and extra large and in the colors blue and white.

OUTCOMES

SB
SW
MB
MW
LB
LW
XB
XW

20. Draw a tree diagram and list all the possible outcomes when you answer 4 true or false questions.

OUTCOMES

TTTT FTTT
TTTF FTTF
TTFT FTFT
TTFF FTFF
TFTT FFTT
TFTF FFTF
TFFT FFFT
TFFF FFFF